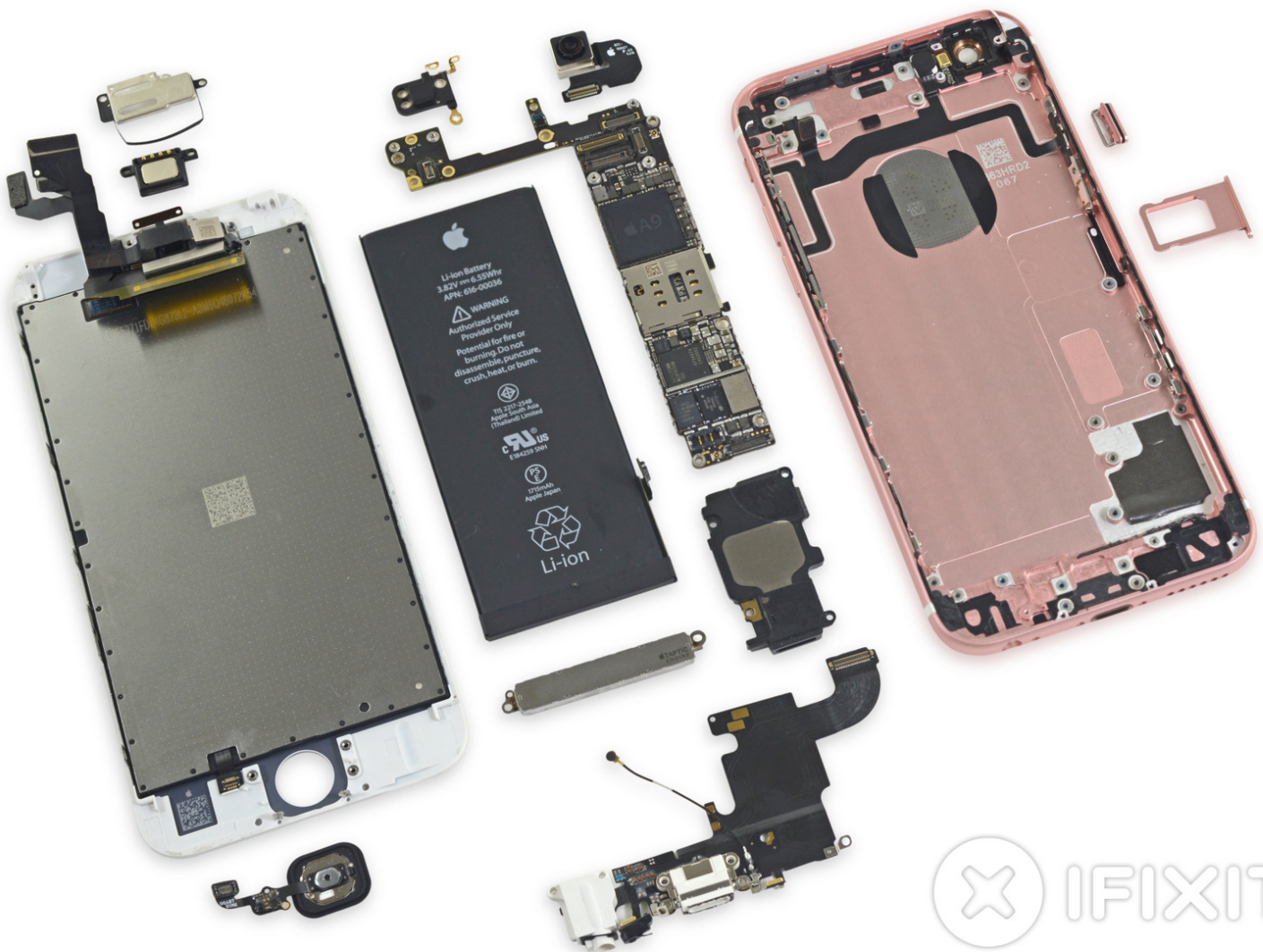




# iPhone 6s Teardown

iPhone 6s Teardown on September 25, 2015.

Written By: Andrew Optimus Goldberg



## INTRODUCTION

One year ago, we tore down Apple's radical new iPhone 6—and it didn't do half bad. Now, Apple say they've crammed a boatload of new technology into a phone that's imperceptibly thicker, just a few grams heavier, and several shades pinker: iPhone 6s. What does that mean, and how will it affect the repairability of our favorite fruit-based phone? Join us **LIVE** to find out—it's teardown time!

Is a 6s teardown just not big enough for you? Then you'll want our [iPhone 6s Plus teardown](#).

A big and hearty mega-thanks to our pals at Chipworks for helping us ID all of this tech. We couldn't have done it without them. Check out their [teardown blog](#). Chipworks is also releasing a comprehensive product teardown report, [sign up here](#) to get it for free!

Gear up for more teardown! Follow us on [Facebook](#), [Instagram](#), or [Twitter](#) for the latest teardown news.

[video: <https://www.youtube.com/watch?v=ROCzV9gMuA0>]

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### TOOLS:

- [P2 Pentalobe Screwdriver iPhone](#) (1)
  - [iSclack](#) (1)
  - [Spudger](#) (1)
  - [Phillips #000 Screwdriver](#) (1)
  - [Nut Driver 2.5 mm](#) (1)
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## Step 1 — iPhone 6s Teardown



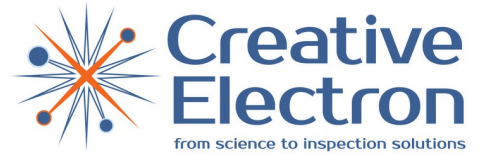
- The 6s may look the same as last year's [iPhone](#), but there are plenty of new features in this phone:
  - Apple A9 processor with embedded M9 motion coprocessor
  - 16, 64, or 128 GB of storage
  - 4.7-inch 1334 × 750 pixels (326 ppi) Retina HD display with 3D Touch
  - 12 MP iSight camera supporting 4K video recording with 1.22  $\mu$  pixels, and a 5 MP FaceTime HD camera
  - 7000 Series aluminum enclosure and Ion-X Glass
  - 802.11a/b/g/n/ac Wi-Fi with MIMO + Bluetooth 4.2 + NFC + 23-band LTE
  - Taptic Engine

## Step 2



- It's finally time to see what this *revolutionary* new iPhone has in store for us.
- At a glance, the 6s is the spitting image of its older sibling, but there's a lot more to it than meets the eye. Here's some of what's under the hood:
  - Improved Touch ID home button
  - 5 MP FaceTime HD Camera
  - Retina HD Display with 3D Touch
- ❗ Laid out side-by-side, there are few notable differences between the two—sans the new Rose Gold enclosure.
- Upon closer inspection, the 6s is a hair larger than the 6 (138.3 x 67.1 x 7.1 mm vs. 138.1 x 67.0 x 6.9 mm), and it's stamped with a new model number: A1688.
- The 6s has also packed on a bit of weight when compared to its older sibling, weighing in at 143 grams vs. the 6's 129 grams.

## Step 3



- Roll your mouse over for superpowers—we've got X-rays on tap, thanks to our plucky cohorts at [Creative Electron](#).
- Together we trekked all the way to Australia to bring you the first-ever glimpse of the latest iPhone innards.
- Our teardown is coming to you live from [Macfixit](#) and [Circuitwise](#). Kudos to them for their hospitality and their 17-hour timezone advantage!
- It's just a taste of what's to come! Let the teardowning begin.

## Step 4



- We've said it before and we'll say it again: Apple is all about the little things. The color of the Pentalobe screws at the bottom of the case match the color of the case. Oh, Apple.
- It seems the iPhone display assembly has toughened up a bit since we last [met](#). It now features four adhesive strips lining the perimeter of the phone.
  - Still, this strong adhesive is no match for our handy-dandy [iSclack](#).
- ⓘ Talk about the little things—it seems even the adhesive strip is [color-matched to the display](#): white for white, and black for black.
- iPhone displays of yore weren't exactly in danger of falling out of the phone, so why the need for adhesive—or could this be a waterproof gasket?

## Step 5



- With the display assembly popped up, we can already spot some internal differences between the 6s and its [predecessor](#).
- The all-new Taptic Engine takes up a large chunk of space below the battery, which might explain the slight reduction in battery size.
- Apple has also condensed the display assembly connections into three cables, as opposed to the four seen in the iPhone 6.



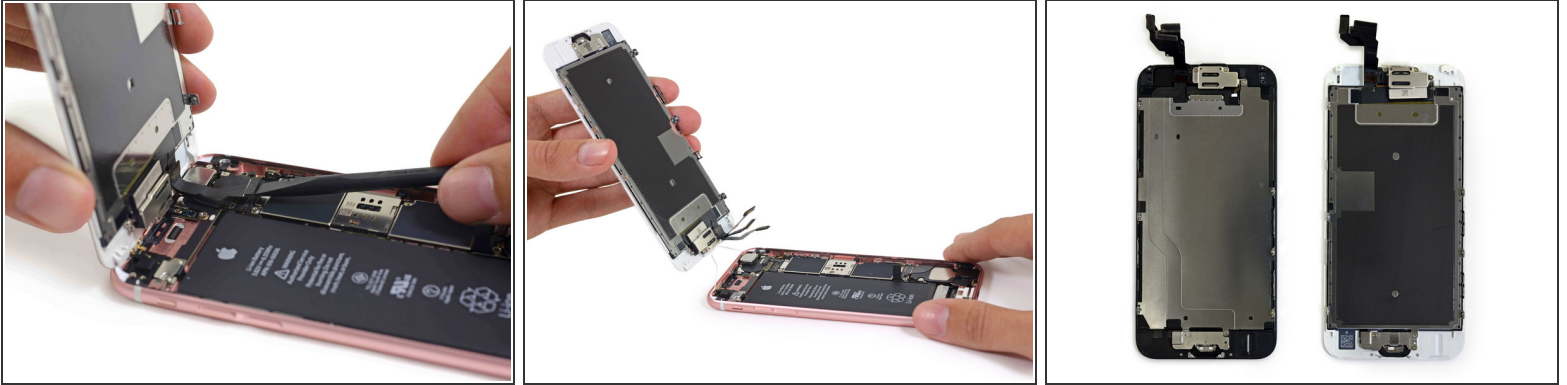
## Step 6



- A quick twist and the battery connector is *disconnected*.
- Despite the [Coriolis effect](#), for screwdrivers it is still righty tighty and lefty loosy—even down under. So for those who were wondering—yes, we still twisted to the left.
- Once inside, we find, as we hoped, Phillips screws. We're glad Apple limits the inclusion of [Pentalobe screws](#) solely to the bottom of the rear case.

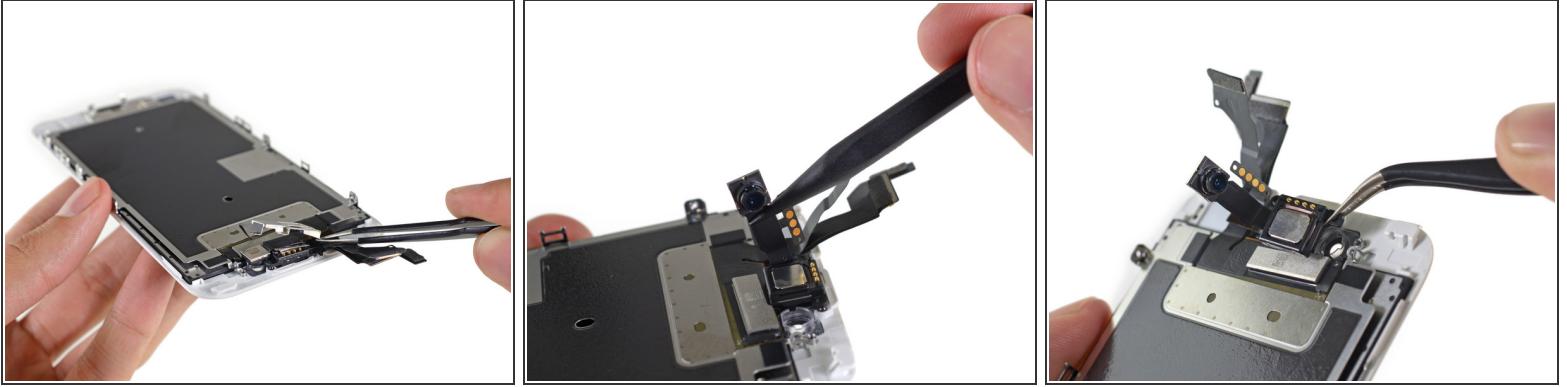


## Step 7



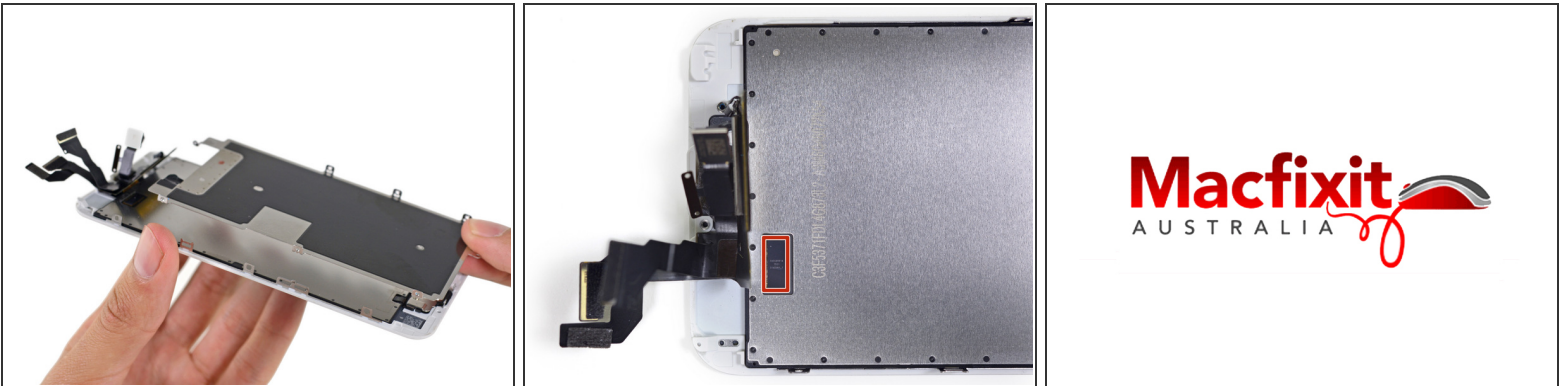
- After some careful spudgering, the display assembly comes free without much of a fight.
- The display assembly weighs in at a whopping 60 grams—a 15 gram increase over the one found in the iPhone 6. In fact, that's the same weight as the much larger display on last year's 6 Plus! The additional capacitive sensors that Apple integrated into the display backlight have really beefed this thing up.
- Save for the reduction in cables, and a slightly different LCD shield plate design, the old and new display assemblies *seem* pretty visually similar.

## Step 8



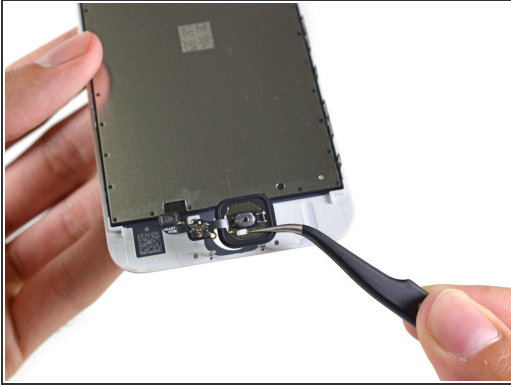
- In order to take out the shield plate we first have to remove a bracket, speaker, and the FaceTime camera.
- While the FaceTime camera has jumped from 1.2 MP all the way up to 5 MP, its overall form factor remains surprisingly similar.
- We have to take a moment to [calm down](#) as we get closer to unearthing the secrets of the new 3D Touch display assembly.

## Step 9



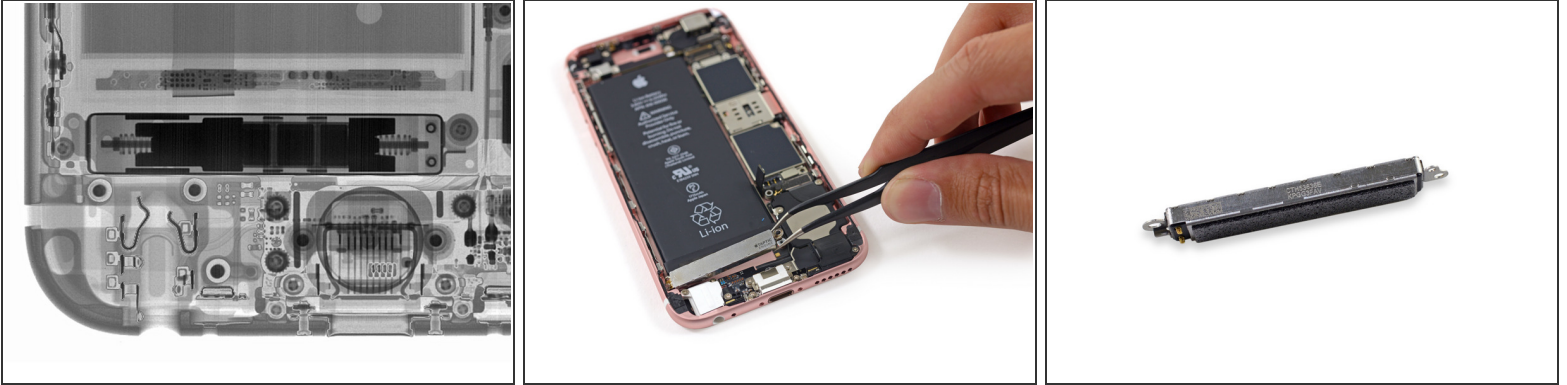
- With the LCD shield plate removed, we get our first glance at what we believe is the 3D Touch IC:
  - 343S00014 (Naming scheme is very similar to other Apple ICs, but the jury is still out on the manufacturer)
- By the way, we want to (again!) send out a big thanks to our good friends at [MacFixit Australia](#) for letting us use their office in Melbourne for the teardown. They stock Mac and iPhone upgrades/accessories, and also carry our [iFixit toolkits](#). Thanks MacFixit Australia!

## Step 10



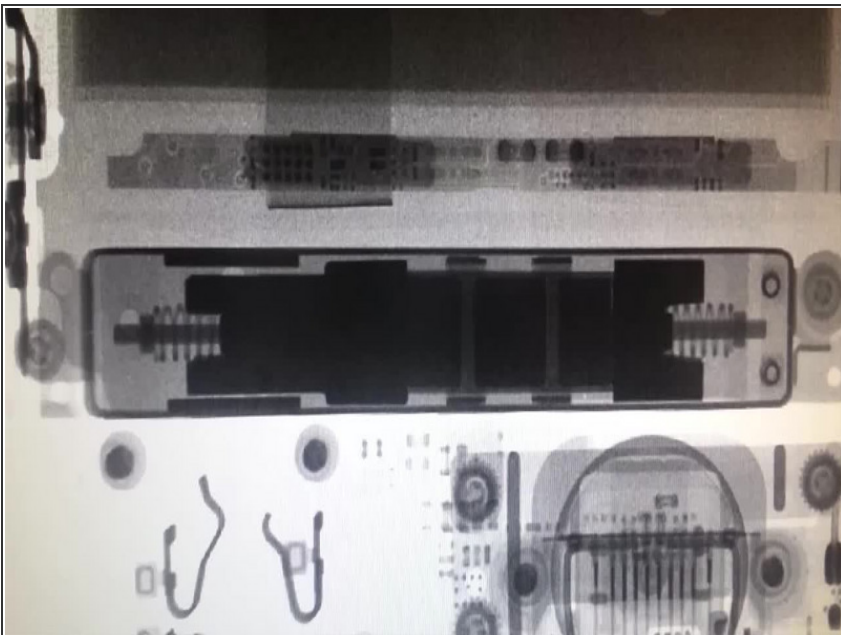
- Removing the shield plate allows access to the home button.
- Extracting the home button from its cozy cutout is a breeze. If issues develop with the home button, the absence of solder or adhesive will make it an easy fix.
- So far, no real evidence of any chip responsible for the "faster and better than ever" Touch ID, but hey, if Apple said so it must be true.

## Step 11



- Back to rose gold tacks... It's time to take out the iPhone's new Taptic Engine.
- A blast of X-ray radiation reveals a peek at the linear oscillating mechanism underlying Apple's latest mechanical wonder, said to reach peak output after just one oscillation.
- ❗ That's not Photoshopped for contrast—dense materials like magnets absorb more X-rays, so the haptic feedback mechanism looks dark and crisp compared to other materials (like the aluminum frame).
- Once removed, there is not much showing what is going on inside—just a couple spring contacts, some cryptic markings, and big label complete with the Apple logo mark.

## Step 12



- If you 3D Touch your phone while wearing X-ray specs, this is what you'll see. *Shake it like a Polaroid picture, Taptic Engine.*

## Step 13



- We breathe a sigh of relief every time we see those nice battery adhesive pull tabs. Hopefully they never go [extinct](#).
- A quick pull and the battery pops right out for inspection!

## Step 14



- It turns out the rumors were true—battery capacity is down a bit, likely in order to make room for new features like the Taptic Engine and slightly thicker display.
- ① The Lithium-ion pack comes in at 3.8 V, 6.55 Wh, and 1715 mAh. It's a small but notable decrease from the [1810 mAh](#) battery in last year's iPhone 6.
- This iPhone's battery still has the same identity issues as [last year's](#). It seems to think it's from Apple South Asia (Thailand) Limited, Apple Japan, and is made in Changsu, China.
- Nevertheless, Apple says battery life holds steady at up to 14 hours of 3G talk time and 10 days of standby—the same as in the iPhone 6. A lot of this is likely due to more efficient silicon, which we're eager to get a look at...

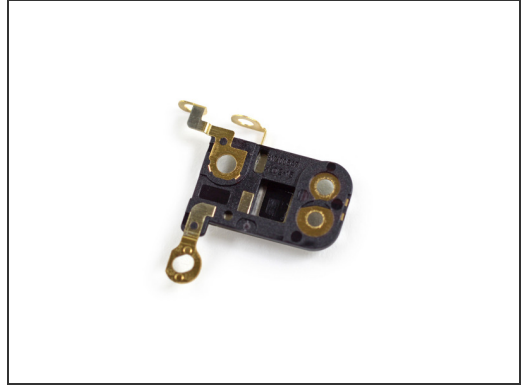
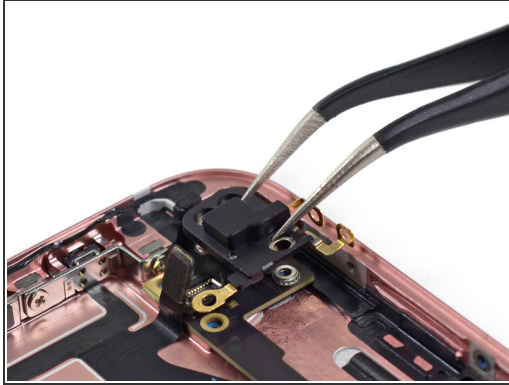
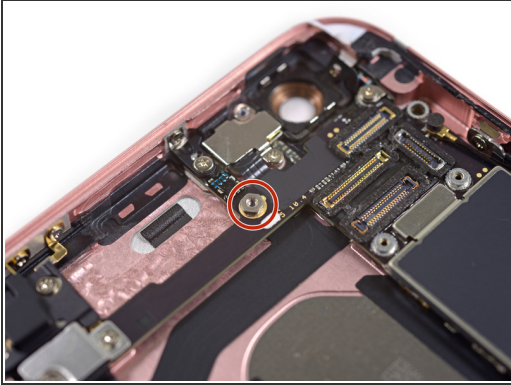


## Step 15



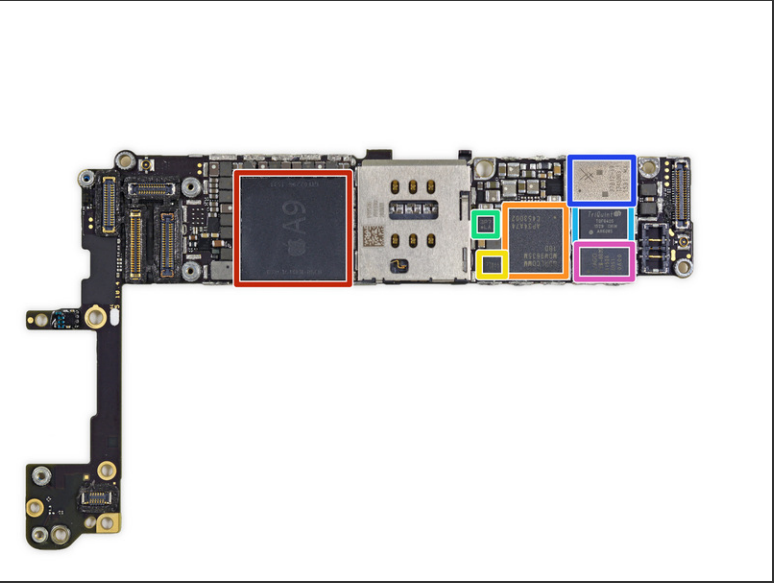
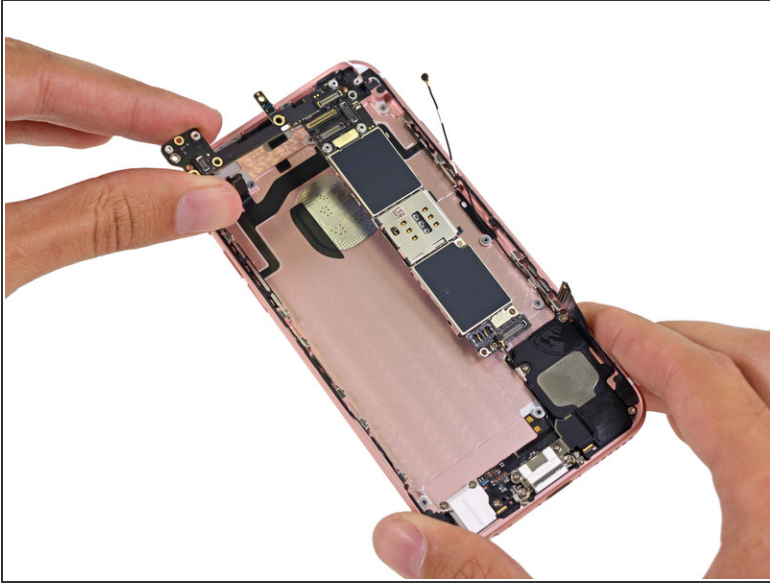
- Next out, the iPhone's 12 MP peeper!
- This year's camera offers a substantial spec bump from the [6](#), including the first resolution increase since the iPhone 4s.
  - [50% more focus pixels](#) means faster, more accurate autofocus without a drop in quality.
  - The new iSight camera also brings the iPhone into the arena of 4K video recording, which has previously been dominated by Android phones.
- Increased pixel density often comes at the cost of a decrease in individual pixel quality, due to crosstalk from competing photodiodes, but this new iSight camera includes some cool technologies that mitigate that issue.
  - ❗ There are electrically insulating trenches etched between the sensor's photodiodes, a process called [Deep Trench Isolation](#), to compensate for leakage between densely-packed pixels.

## Step 16



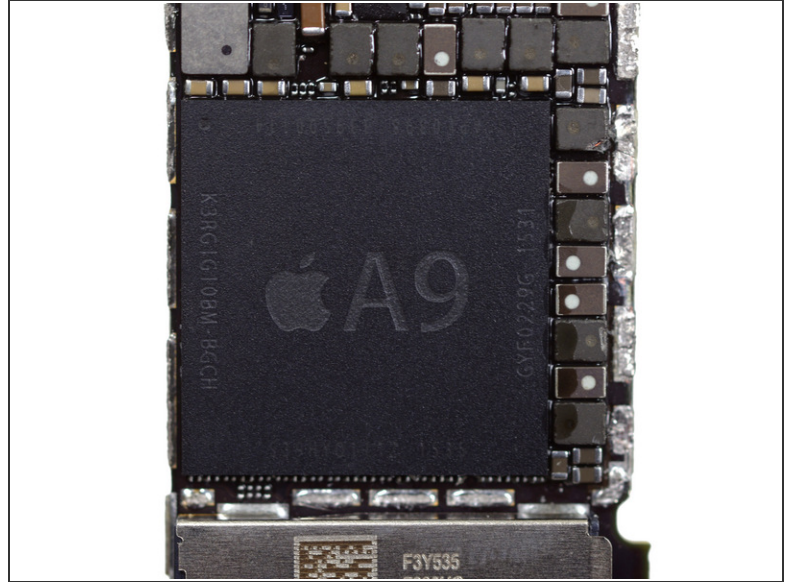
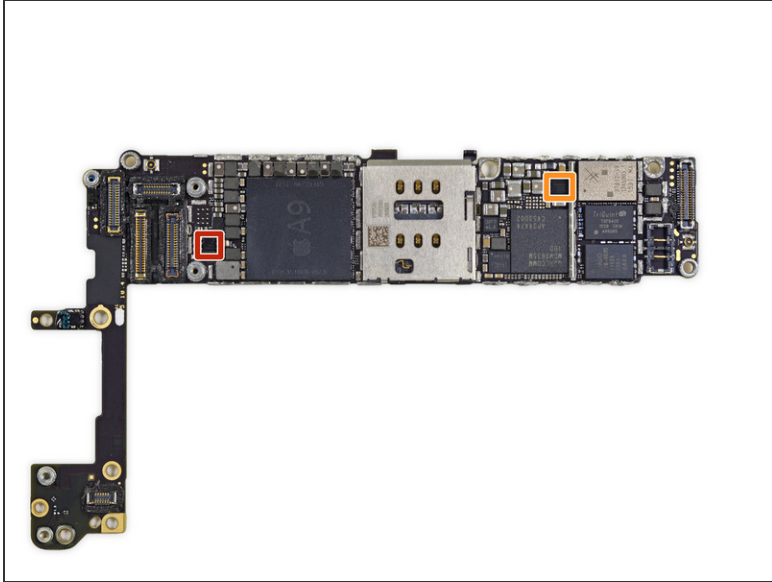
- And now, for a trip into the Twilight Zone...
- We find a strange 2.5 mm hex head in the place of the more standard stand-off screw. Add a new tool to your smartphone arsenal...
- And out comes the [Lovecraftian](#) antenna unit seen in [previous models](#).

## Step 17



- And now, for the moment we've all been waiting for... It's time to reveal some ICs on the front of the logic board:
  - Apple A9 [APL0898](#) SoC + Samsung 2 GB LPDDR4 RAM (as denoted by the markings K3RG1G10BM-BGCH)
  - Qualcomm [MDM9635M](#) LTE Cat. 6 Modem (vs. the [MDM9625M](#) found in the iPhone 6)
  - InvenSense [MP67B](#) 6-axis Gyroscope and Accelerometer Combo (also found in iPhone 6)
  - Bosch Sensortec 3P7 LA 3-axis Accelerometer (likely [BMA280](#))
  - TriQuint [TQF6405](#) Power Amplifier Module
  - Skyworks [SKY77812](#) Power Amplifier Module
  - Avago [AFEM-8030](#) Power Amplifier Module

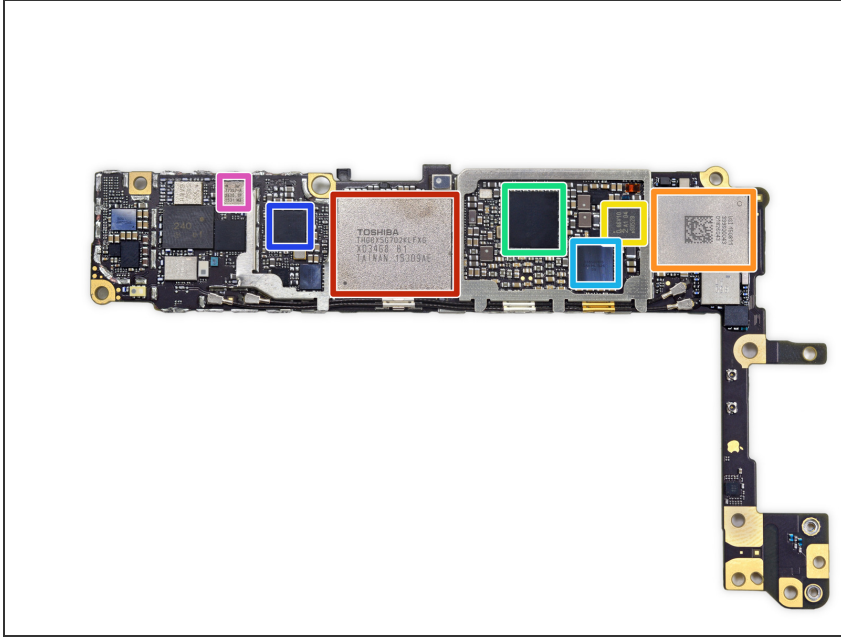
## Step 18



- Two more ICs on the front of the logic board:
  - 57A6CVI
  - Qualcomm [QFE1100](#) Envelope Tracking IC

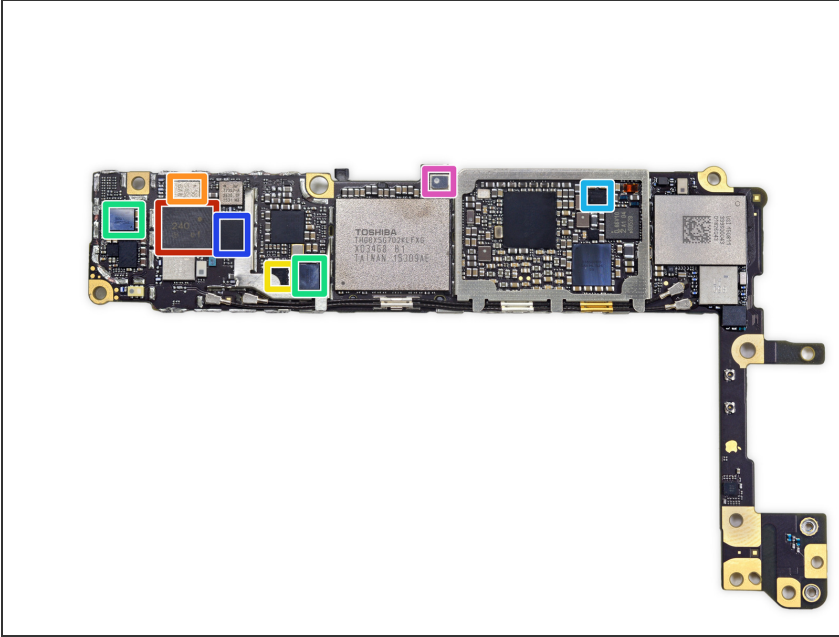
**i** Based on alleged schematics leaked last month, the rumor mill had the A9 pegged at a 15% smaller die size from the A8. We can't confirm the die size, but the A9 package itself appears bigger—roughly 14.5 x 15 mm, up from 13.5 x 14.5 mm on the A8. That could represent a smaller die plus the addition of the embedded M9 and other functions.

## Step 19



- But wait, there's more! We'll double your order of chips absolutely free!
- Toshiba THGBX5G7D2KLFXG 16 GB 19 nm NAND Flash
- Universal Scientific Industrial [339S00043](#) Wi-Fi Module
- NXP [66V10](#) NFC Controller (vs. 65V10 found in iPhone 6)
- Apple/Dialog 338S00120 Power Management IC
- Apple/Cirrus Logic 338S00105 Audio IC
- Qualcomm PMD9635 Power Management IC
- Skyworks [SKY77357](#) Power Amplifier Module (likely an iteration of the [SKY77354](#))

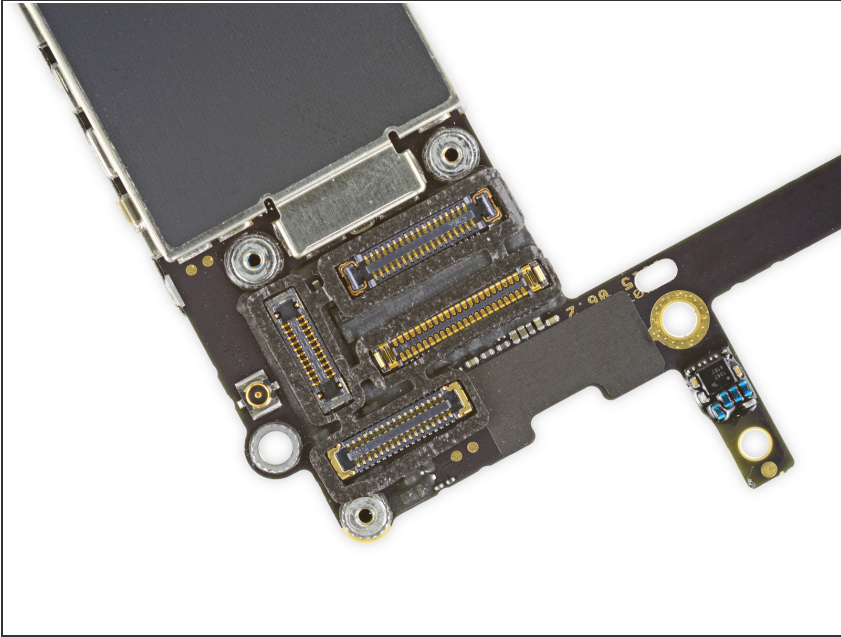
## Step 20



- More ICs on the back of the logic board:
  - Murata 240 Front-End Module
  - RF Micro Devices [RF5150](#) Antenna Switch
  - NXP 1610A3 (likely an iteration of the [1610A1](#) found in the iPhone 5s and 5c)
  - Apple/Cirrus Logic [338S1285](#) Audio IC (likely an iteration of the [338S1202](#) audio codec found in the iPhone 5s)
  - Texas Instruments [65730AOP](#) Power Management IC
  - Qualcomm [WTR3925](#) Radio Frequency Transceiver
  - Possibly a Bosch Sensortec Barometric Pressure Sensor ([BMP280](#))

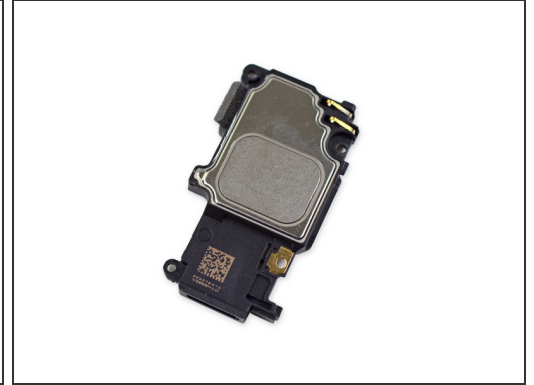
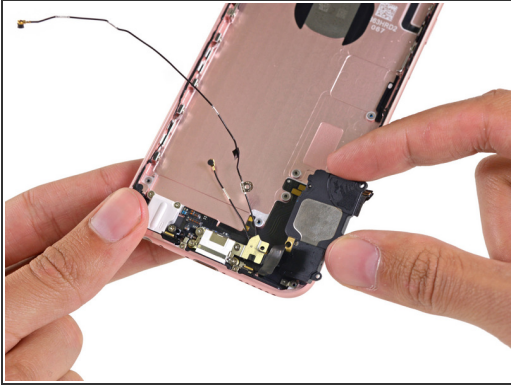


## Step 21



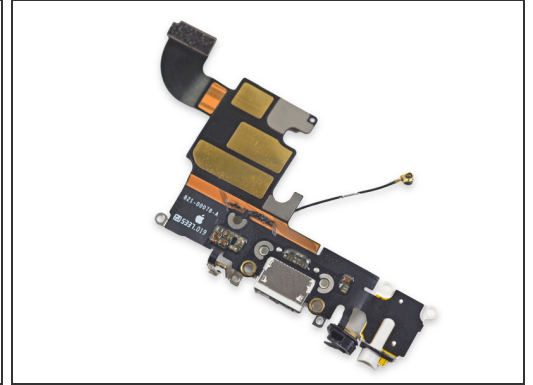
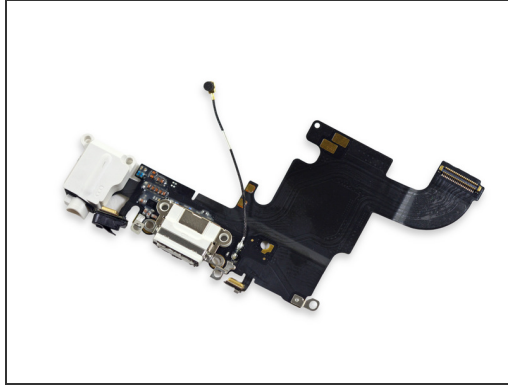
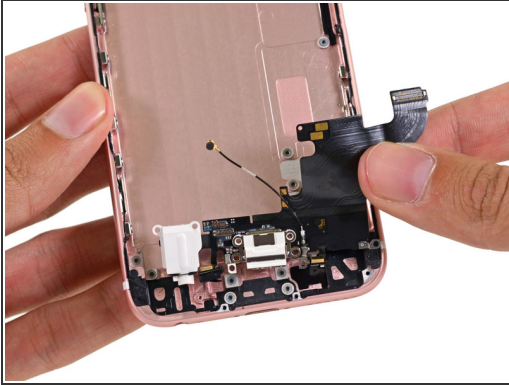
- **Teardown update!** It turns out this logic board has a secret weapon: tiny seals surround each of the cable connectors. (They look like black foam hedges surrounding each of the gold connectors.) What can it mean?
- Answer: we think those are ***waterproof silicone seals***. They appear to match a [patent Apple filed back in March](#) for waterproofing board-to-board connectors.
- ⓘ When it comes to liquid damage, those cable connectors are among the most vulnerable parts of the phone.
- This would seem to explain [recent tests](#) showing the 6s and 6s Plus to be dramatically more resistant to liquid damage.

## Step 22



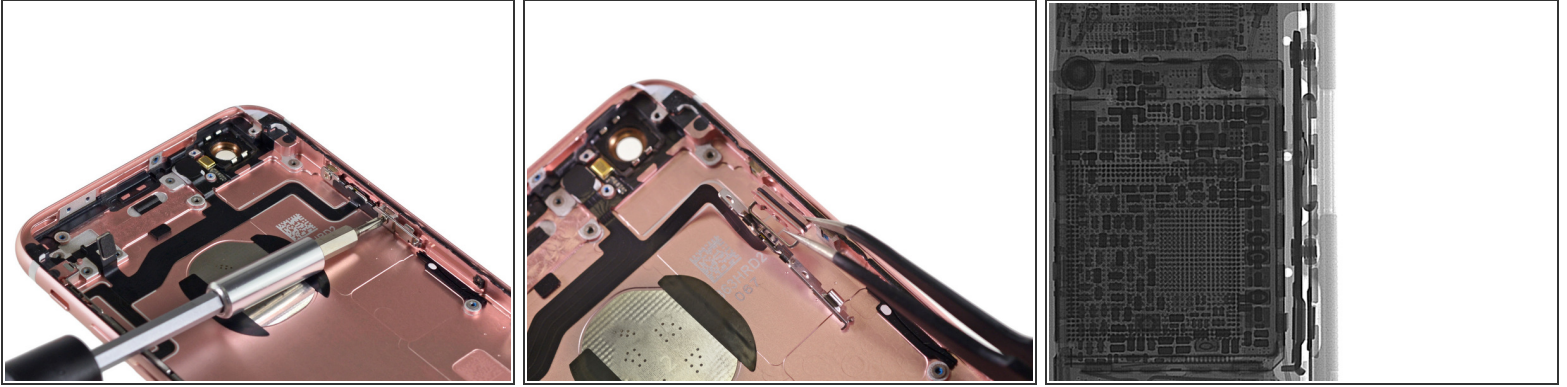
- Time to pick out the last goodies. The first to drop: the ~~bass~~ speaker.
- A closer look at the speaker reveals... not much, actually.
- The 6s speaker appears to be a very close cousin to the speaker from the [iPhone 6](#). We suspect the difference in shape can be attributed to the addition of the Taptic Engine.

## Step 23



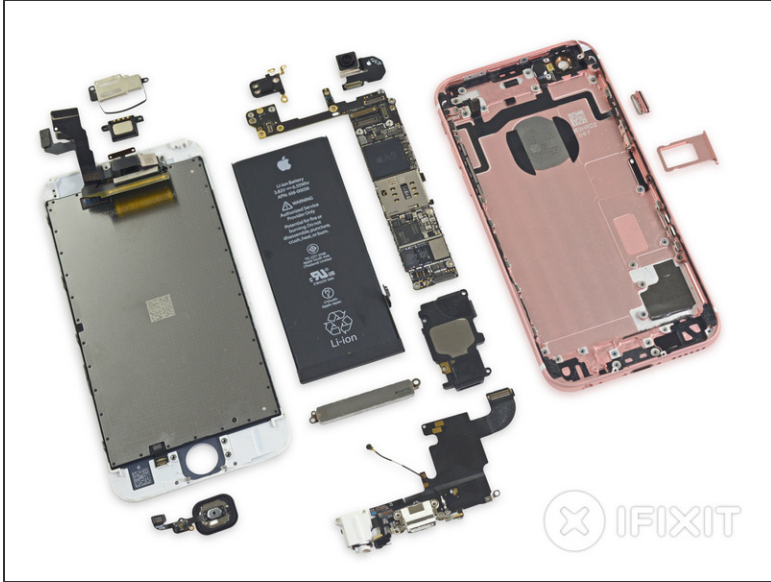
- And now, the famous "everything cable" (a.k.a. the Lightning cable assembly), featuring not one, but *two* microphones!
- Beyond the two microphones, the Lightning cable assembly plays host to an impressive array of components:
  - Lightning port to meet your charging/data transfer needs.
  - Headphone jack for your audio needs.
  - Cell antenna cables for all your cellular needs.
- While the Lightning cable assembly is a fine example of engineering efficiency, it doesn't bode well for repairs. A single broken component means the whole cable will need to be replaced.

## Step 24

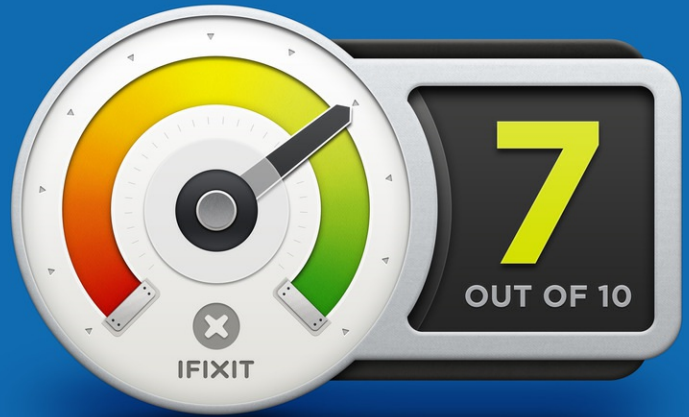


- This teardown opens at the close: The final step is the Sleep/Wake button!
- The large gasket of yore is gone, but there's still some waterproofing going on.
  - That said, this device doesn't come with a water resistance rating, and we do not recommend getting your 6s wet. Water and smartphones are not the best of friends.

## Step 25



## REPAIRABILITY SCORE:



- The iPhone 6s keeps up the decent work, earning a **7 out of 10** on the Repairability scale:
  - The display assembly continues to be the first component out, simplifying screen repairs.
  - The battery is straightforward to access. Removing it requires a proprietary pentalobe screwdriver and knowledge of the adhesive removal technique, but is not difficult.
  - The Touch ID cable is still tucked out of the way, but is paired to the logic board, complicating repairs.
  - The iPhone 6s still uses proprietary Pentalobe screws on the exterior, requiring a specialty screwdriver to remove.

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